

Application No.: 10/716346
Docket No.: CL2221USNA

Page 5

REMARKS

Claims 1-27 are in the case. The claims have been made subject to a requirement to restrict. By a provisional election made telephonically on 3.16.05 Applicants elected invention III including claims 21-27. Applicants hereby affirm this election. Accordingly claims 1-20 have been withdrawn from consideration. In order to preserve the right of rejoinder Applicants choose not to cancel withdrawn claims at this time.

Claims 21 and 22 have been amended to more clearly define Applicants invention.
No new matter has been added.

Specification

The specification is objected to for failing to provide antecedent basis for claimed subject matter. Specifically the examiner suggests there is no support in the specification for the limitation of an "unfunctionalized carbon nanotube".

Applicants have amended the claims to overcome this objection.

Claim Rejections – 35 USC § 112

Claims 21-27 are rejected under 35 USC § 112, second paragraph for indefiniteness. Specifically the examiner finds the recitation of "unfunctionalized carbon nanotube" indefinite and imposing a negative limitation on the claim. Applicants traverse.

The claim has been amended to overcome this rejection. The Claim is drawn to carbon nanotube - nucleic acid complex. This complex is defined on page 5 beginning at line 10 of the specification. The definition includes the limitation that the association of the nucleic acid be by non-covalent means. Thus, basis for this amendment is found in the paragraph beginning on page 5, line 10. Additional support for the non-covalent nature of the attachment of the nucleic acid to the carbon nanotube may be found throughout the specification and the examples.

Claim 22 is rejected under 35 USC § 112, 2d paragraph for the recitation of "double stranded DNA, RNA, and PNA" as it is unclear what term the phrase "double stranded" modifies. Applicants traverse.

The Claim has been amended to overcome this rejection.

Claim Rejections – 35 USC § 102

Claims 21-25 are rejected under 35 USC § 102(a) as being anticipated by Williams et al (AIP conf. Proc. 2002, 663:444), hereinafter "Williams". Applicants respectfully traverse.

Williams teaches the use of oligonucleotides of specific sequence complexed to carbon nanotubes through covalent bonds for the purpose of using the oligonucleotide for carbon nanotube assembly on a substrate. Williams does not teach the wrapping of carbon nanotubes

Application No.: 10/716346
Docket No.: CL2221USNA

Page 6

with a nucleic acid molecule via non-covalent means or the use of nucleic acids for the purpose of dissociating carbon nanotube ropes.

The claims have been amended to recite that the nucleic acid molecule of the carbon nanotube - nucleic acid complex be associated with the carbon nanotube via non-covalent means. Williams clearly teaches that the oligonucleotides described were covalently bonded to the carbon nanotubes, (See first full paragraph page 445, last paragraph of 446, describing ester-derivatized tubes for covalent linking of oligos and the Summary and Future Work, page 448, describing NHS/EDC-mediated covalent coupling of oligos to the carbon nanotubes).

For a rejection under 35 USC § 102 to be valid, each and every element of the claimed invention must be found in a single reference. As the limitation of non-covalent linkage of the nucleic acid molecule is not taught in Williams, applicants submit that the claims as amended are patentable over Williams and respectfully request removal of this rejection under 35 USC § 102(a).

Claim 21 is rejected under 35 USC § 102(b) as being anticipated by Lieber et al (U.S. 6159742) hereinafter "742". Applicants traverse.

'742 teaches the use of carbon based nanometer scale probes for microscopy. The probe of '742 comprises a carbon nanotube, a linking group and a molecular probe bonded to the linker. The molecular probe may be a polynucleotide. '742 does not teach a carbon nanotube associated with a nucleic acid via non-covalent means.

As noted above, the claims are currently amended to recite that the nucleic acid molecule of the carbon nanotube - nucleic acid complex be associated with the carbon nanotube via non-covalent means. '742 teaches the association of the molecular probe (polynucleotide in one embodiment) with the carbon nanotube via linked where the linker represents a covalent attachment (see column 1 line 60 where the linked is an amino, amido, carbonyl, carboxyl group etc.). Thus, since each and every element of the claimed invention cannot be found in '742 Applicants submit that the present invention is neither anticipated nor made obvious by '742 and respectfully request removal of this rejection.

Claim Rejections – 345 USC § 103

Claims 26 and 27 are rejected under 35 USC § 103(a) as being unpatentable over Williams, in view of Navot et al (U.S. 5650277, hereinafter "277").

The teachings of Williams are given above.

'277 teaches the derivitization of nucleic acids with binding adducts for targeting the DNA to surfaces, i.e metal beads.

It is the examiner's opinion that it would have been obvious to the skilled person to combine the teaching of Williams (carbon nanotubes covalently attached to oligonucleotides)

Application No.: 10/716346
Docket No.: CL2221USNA

Page 7

with the teachings of '277 (nucleic acids having binding adducts incorporated therein) to derive the instant invention as described in claims 26 and 27. Applicants respectfully traverse.

§ 2143 of the MPEP establishes a three part test for a valid rejection under 35 USC § 103. § 2143 of the MPEP states that in order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. All elements of the test must be present.

In relevant part the examiner's arguments fail the third part of the test, because the prior art references do not teach or suggest all the claim limitations. As noted previously the claims have been amended to recite the limitation that the association of the nucleic acid molecule with the carbon nanotube be by non-covalent means. It is has been established that the teachings of Williams require that the oligos be attached by covalent bonds. Thus all the elements of the claimed invention are not found in the references as combined.

Claims 22-25 are rejected under 35 USC § 103(a) as unpatentable over '742 in view of Williams.

The teachings of '742 and Williams have been given previously.

The examiner asserts that, because '742 teach a nanotube complex bound to a nucleic acid, and because Williams teach the use of synthetic DNA and PNA can be used for recognition of substrates that the skilled person would logically combine the references to derive the present invention. Applicants respectfully traverse.

The standard for a valid rejection under 35 USC § 103 is given above. As noted above Williams lacks an essential element of the claimed invention and thus the combinations of the references fails to support a rejection under 35 USC § 103.

Double Patenting

Claims 21-23 and 25-27 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 14 and 19 of co-pending Application No. 10/716347.

While not intending to agree with the Examiner's rationale concerning this rejection and the similarity of the claims of the present application and those of co-pending Application No. 10/716347, Applicants elect to address this issue at the time of the allowance of one of the relevant applications.

Application No.: 10/716346
Docket No.: CL2221USNA

Page 8

In view of the foregoing Applicants respectfully request reconsideration of the claims as amended and removal of all rejections.

Respectfully submitted,



S. NEIL FELTHAM
ATTORNEY FOR APPLICANTS
Registration No.: 36,506
Telephone: (302) 992-6460
Facsimile: (302) 992-5374

Dated: May 19, 2005